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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/471,173	12/23/99	MOROSAWA N	0020-4652P

MMC2/0925
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EXAMINER	
QUINTO,K	
ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 09/25/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/471,173	MOROSAWA ET AL.	
	Examiner	Art Unit	
	Kevin Quinto	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 2-6 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 2 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitani et al. (USPN 6,191,463 B1) in view of Gilmer et al. (USPN 5,821,172).

4. So far as understood in claim 2, a gate transistor is described with a gate electrode on a substrate. There is a gate insulator between and in direct contact with them. The gate insulator is composed of silicon, oxygen, nitrogen, and a halogen element. Such a device is described in Mitani et al. (USPN 6,191,463 B1, hereinafter referred to as Mitani). In claim 1 of Mitani (column 42, lines 18-37), a substrate is described with two gate electrodes (control and floating gate electrodes) stacked on top of each other with insulating films (a first and second insulting films) between them, and an insulating film (the first insulating film) between the floating gate electrode and the substrate. The first insulating film is composed of a combination of silicon, oxygen, nitrogen, and a halogen element.

Mitani does not disclose the exact nitrogen atom concentration of the applicant (1×10^{20} cm^{-3}). However it is known in the semiconductor art that having a nitrogen atom concentration of this quantity in a gate insulator can prevent the penetration of boron atoms into the channel region as well as increase the reliability of the gate insulator itself. This is disclosed by Gilmer et al. (USPN 5,821,172, hereinafter referred to as the "Gilmer" reference) in column 2, lines 15-18. Gilmer further discloses a gate insulator with a nitrogen concentration of 1×10^{20} atoms/cm^2 (column 3, lines 34-35). Therefore it would be obvious to utilize a gate insulator having a nitrogen concentration of 1×10^{20} atoms/cm^2 in the device of Mitani so as to attain the advantages of the prevention of boron penetration and increased gate insulator reliability.

5. Regarding claim 4, the gate transistor is further described as having a floating gate and a control gate with an insulator layer between them. As discussed above, claim 1 of Mitani et al. (USPN 6,191,463 B1) describes a transistor with control and floating gates. A second insulating film is between them.

6. Regarding claim 5, Mitani states that the halogen element is fluorine (in claim 2 of Mitani).

7. Regarding claim 6, the language of the claim is a reiteration of claim 2 with the added limitation of the gate insulator thickness. Mitani does not disclose this thickness. However:

> Note that the specification contains no disclosure of either the critical nature of the claimed dimensions or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore claim 6 does not distinguish over the prior art reference of Mitani or Gilmer.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mitani et al. (USPN 6,191,463 B1) in view of De La Moneda (USPN 4,016,587).

9. Regarding claim 3, the language of the claim is a reiteration of claim 2 without the nitrogen atom concentration (1×10^{20} cm^{-3}) but with the added structural limitation where the source and drain are above the channel portion. Mitani does not disclose this exact transistor structure, however this structure is well known in the art. De La Moneda (USPN 4,016,587) discloses a transistor which has a source and drain region above the channel portion. This is done so as to gain the benefit of shallow junctions in the substrate (column 1, lines 68 and column 2, lines 1-2). Shallow junctions in the substrate ultimately lead to a reduction of the channel length without having to reduce the gate insulator thickness or increase the substrate doping concentration which lead to other side effects (column 1, lines 25-48, and column 2, lines 3-7). Therefore it would be obvious to construct the device of Mitani in this manner so as to attain the benefit of reduced channel length without the side effects caused by reduced gate insulator thickness and increased substrate doping.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (703) 306-5688. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

KVQ
September 23, 2001

Nathan Flynn
Primary Examiner